

Using Templates to Support Crisis Action Mission Planning

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Abstract

In this paper we describe a software system called *Tracker* being developed under the DARPA Active Templates research program. *Tracker* allows users to define and use templates to support problem solving, e.g., crisis action mission planning. Our premise is that templates simplify problem solving by (a) providing flexible ways to make and record decisions, (b) reminding you to perform certain tasks, (c) encapsulating experience and domain knowledge, and (d) constraining task specification and language. In our vision, templates, when filled in and linked, can represent entire plans. In other words, the overall plan context may be embodied in a pre-existing template model that specifies how other more detailed templates are associated with each other. For example, the IRS tax forms are a collection of templates. The detailed templates that make up the IRS tax forms describe tasks or decision points and their alternatives. There is the main 1040 form, and then many schedules (detail templates) that are filled in as needed. The tax templates that make up the IRS tax forms work since each tax form is designed to collect data relative to some aspect of taxation as defined in a model that embodies the laws governing tax collection.

The Authors' Approach to the Problem

In today's organizations the power of the Internet is very well understood. In many sectors, having access to information from third party, open source sites, is extremely beneficial. For example, think of the requirements associated with traveling to a foreign country. There are probably several important questions that immediately come to mind such as: (a) travel advisories, (b) weather, (c) currency exchange rates, (d) endemic disease and (e) crime rate. We, like others, are faced with the challenge of getting web data into a format that is useful. Linking to an entire web site is not difficult, using HTML to narrow the link is also easy, but extracting specific values from a web site is more difficult because the HTML markup for web pages describes visual presentation and not semantic content. Since many researchers are actively investigating methods that allow data from web pages to be accessed and used more easily, *Tracker* developers have instead concentrated on developing methods that support access to multiple heterogeneous data sources such as: remotely executing programs, data text files, graphics files and programs, and a variety of databases. We have also concentrated on providing methods that allow users to manage the data that they are collecting. To date, we have developed templates that support tax preparation, traveling, project management, and crisis action planning. In this paper, we describe some of the features of *Tracker* that have been developed to support this myriad of domain applications.

The Relevance of Tracker to Command and Control

The *Tracker* software was developed to support planners in a crisis situation. The objective of the tool is to allow planners at different levels of the command and control (C2) structure to use the templates to support crisis action mission planning. For example, *Tracker* is currently being used to support military planners in the generation of mission planning folders. These folders can be developed to describe the state, objectives, resource availability and other aspects of a mission. The crisis action mission planning process or workflow can also be described. For example, Figure 1 contains a workflow model and associated information flow requirements descriptive of a Fire Department plan. Figure 2 contains some of this same information, but as

it is represented in a *Tracker* template. Any field in a template can be filled with data or with a pointer to another template. In Figure 2, the field “Establish Command and Staff Positions” is filled with a pointer to the tasks associated with a command staff position.

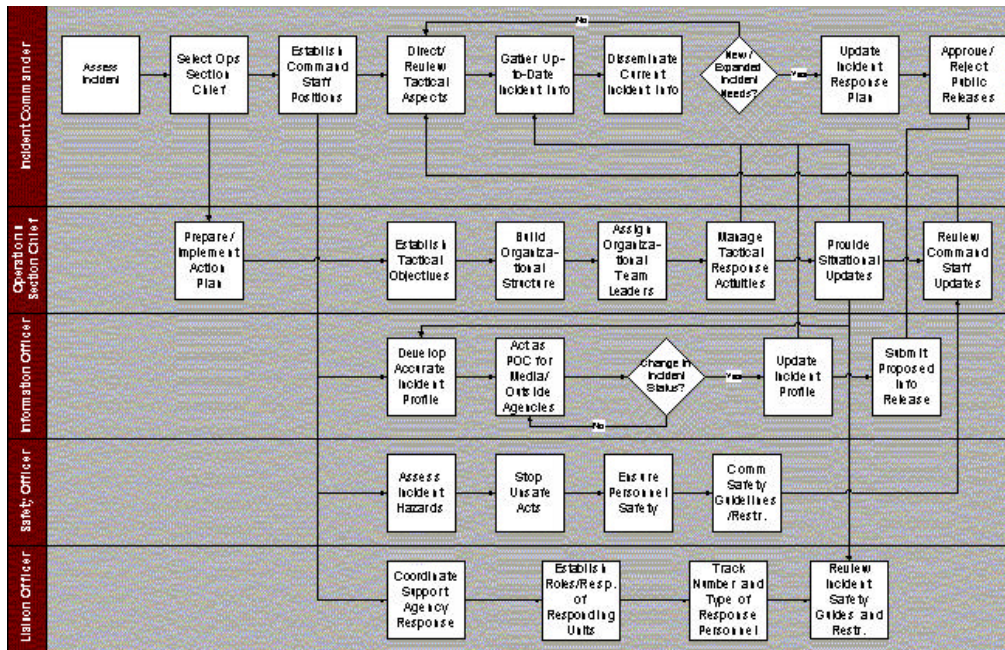


Figure 1 - An example workflow with information requirements for a Fire Department Plan.

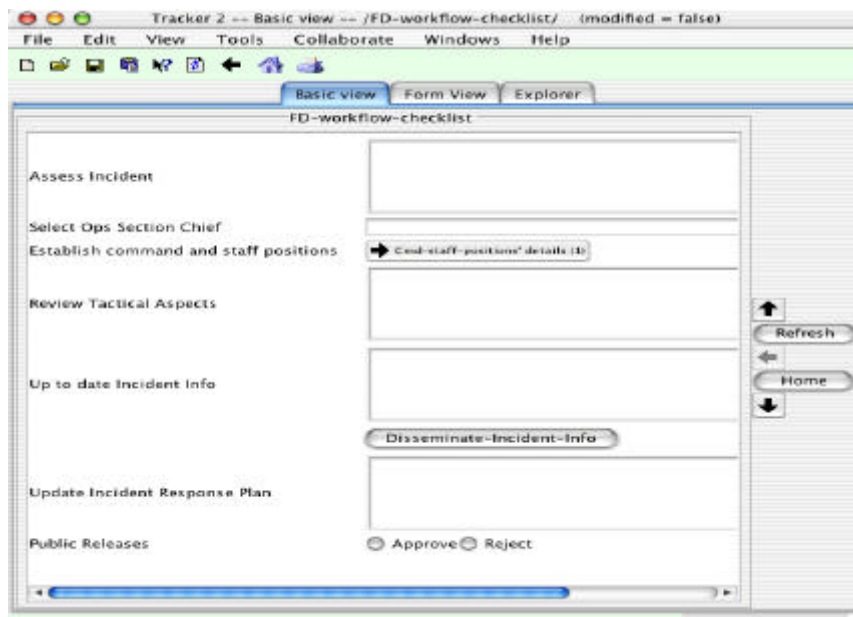


Figure 2 - Example Fire Department Workflow Tracker Template

Tracker provides the user with three modes of use: author, user, or collaboration. *Tracker*'s authoring tools allow users to author templates on-the-fly or with the support of specific data models (like the workflow diagram displayed in Figure 1). Templates can be simple or complex and can be developed using some of the tools that are shown in Figure 3. In developing

complex templates, our interaction with users indicates that a data model based on a combination of two input factors: (a) doctrine or protocol, and (b) domain scenarios, facilitates the authoring of the templates and increases the likelihood that the resulting templates will meet the needs of the end user. For example, a scenario, when provided by a user, can be used to identify what templates need to be built, how the templates should interact and what external data sources should be accessed in order to support information usage. The scenario can also be used to support experimentation and testing and it can provide an environment through which to evaluate how a set of users might collaborate with the templates.

Once a template or set of templates is authored, it can be used to support a particular problem. For example, the templates developed to support a Fire Department crisis can be used to gather and record information about the crisis. These “instantiated” crisis action mission templates can be named and stored to a local disk site; to a common server; or to a database. If there is a need for collaboration among several planners, the template files can be developed collaboratively.

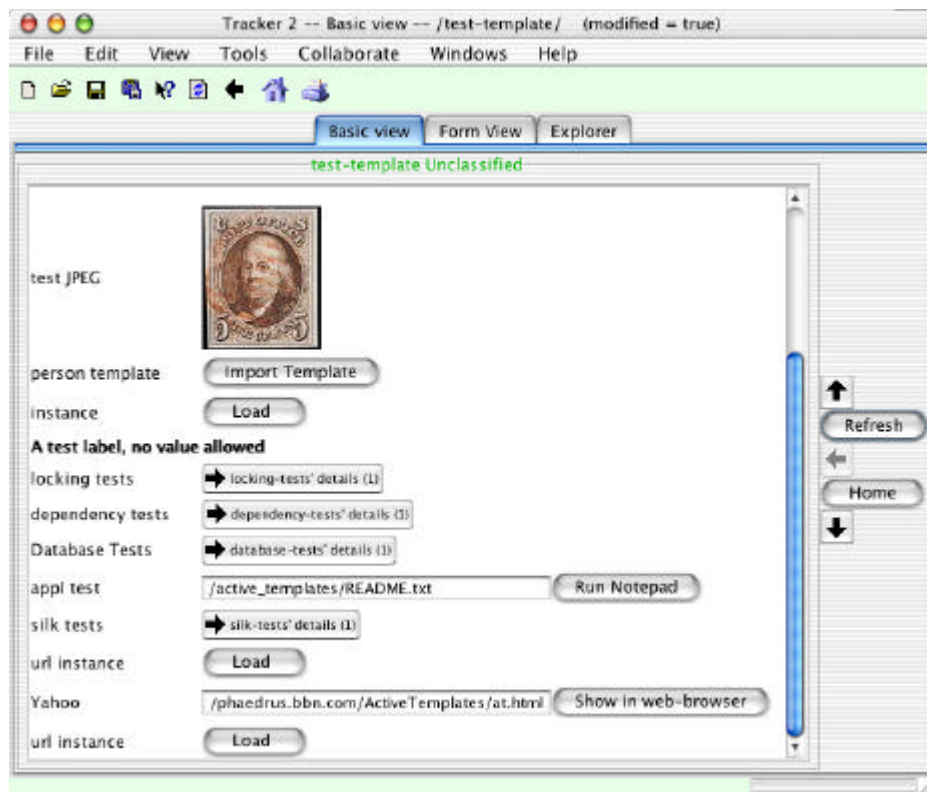


Figure 3 - Example Authoring Tools

For example, the process described in Figure 1 indicates not only what information must be collected, but, how it needs to be disseminated to specific team members (listed on the left side of Figure 1). *Tracker* supports a number of communication protocols to enable each of the team members to collaborate and/or share template data. These communication protocols are summarized in Figure 4 and will support a set of local users or external users and/or systems. One of the communication protocols available in *Tracker* is similar to NetMeeting. With this communication protocol, one team member acts as the host and other team members join and share data. Unlike NetMeeting, the data is shared, not just the pixels. An alternative

communication protocol that is useful when people share a common file space is the usage of a local shared drive. In this method, different team members can freely work on the part of the plan that they are responsible for and simply save their edited versions back to the shared drive so that other users can access them. User roles are employed to implement read/write privileges and an alert mechanism has been developed to help the user obtain information about changed files. The alert mechanism allows a user to subscribe to a file (by name), and each time that this file is changed, the user will receive a change notice.

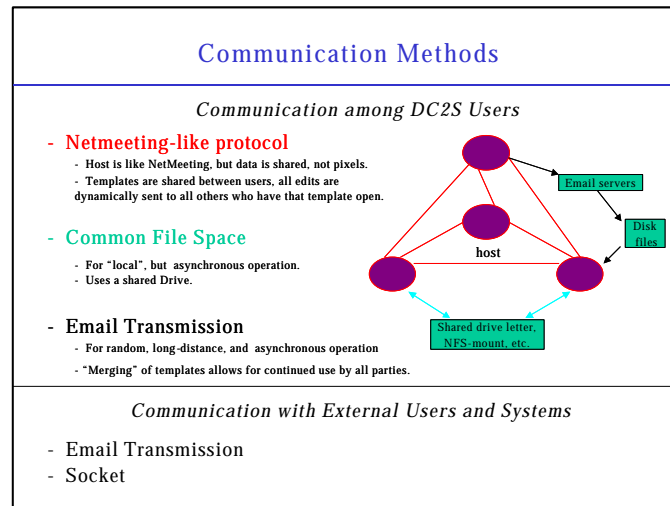


Figure 4 - Tracker Communication Protocols

We are currently investigating methods that provide the data about what changed and that allow the user to more precisely specify what data field(s) they want to monitor. Users can also email the XML-based templates to anyone, export template data into a database format, or communicate with external programs.

The *Tracker* user has a variety of choices available for modifying templates during use. Figure 5 illustrates the modify properties menu from *Tracker*. Here a user can choose or modify how data is to be accessed or displayed, e.g., text, graphics, URL, databases. The "modify properties" menu also allows the user to specify if a field is essential and what edit role is associated with a field. In addition, the user can add attachments to any field. When the user selects the attachment option, a paperclip icon will be displayed next to the field, and when the user clicks on this paperclip, the attachment will open in it's preferred application, e.g., PowerPoint, Excel, MSWord.

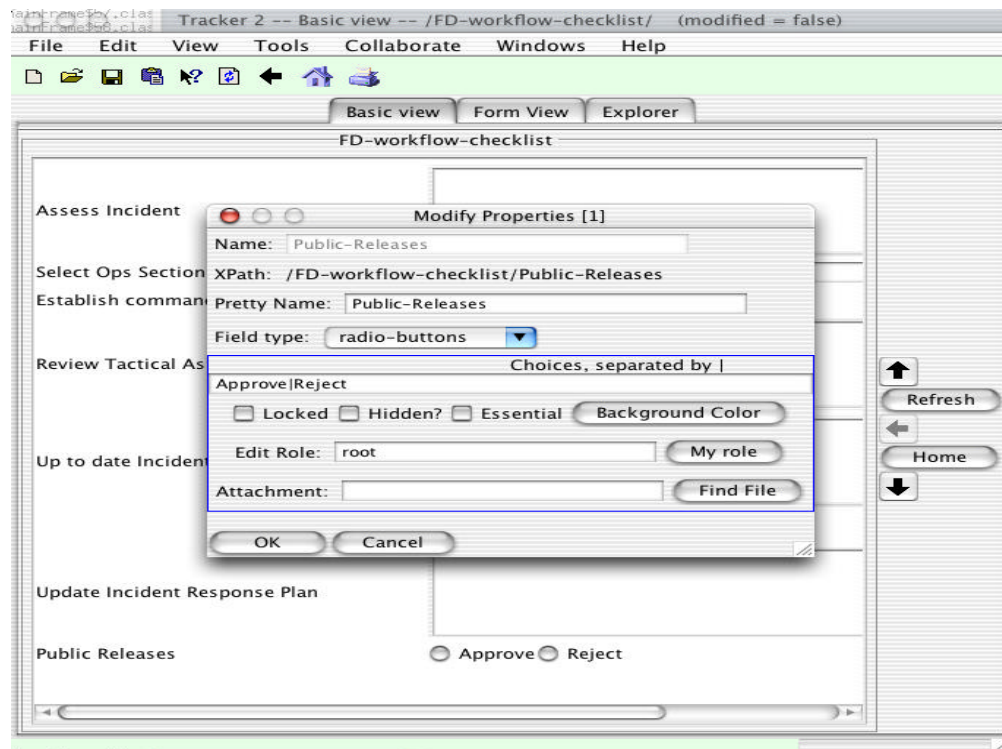


Figure 5 - Tracker Template Modification Choices

We are currently investigating methods to generate external reports such as basic text files, PowerPoint presentations, or Microsoft Word documents directly from our XML data. In the future, we also plan to support the exporting of data to other tools such as route planners, temporal display tools, and mapping tools, in essence, any 3rd-party tool that contains some known or inferable external interface.

Managing Data in Tracker

In crisis action planning, users may opt to save crisis action plans that have been executed or that are in the planning process. We have developed a template browser that enables the user to search through a mission, a folder of mission data, or a folder of mission folders.

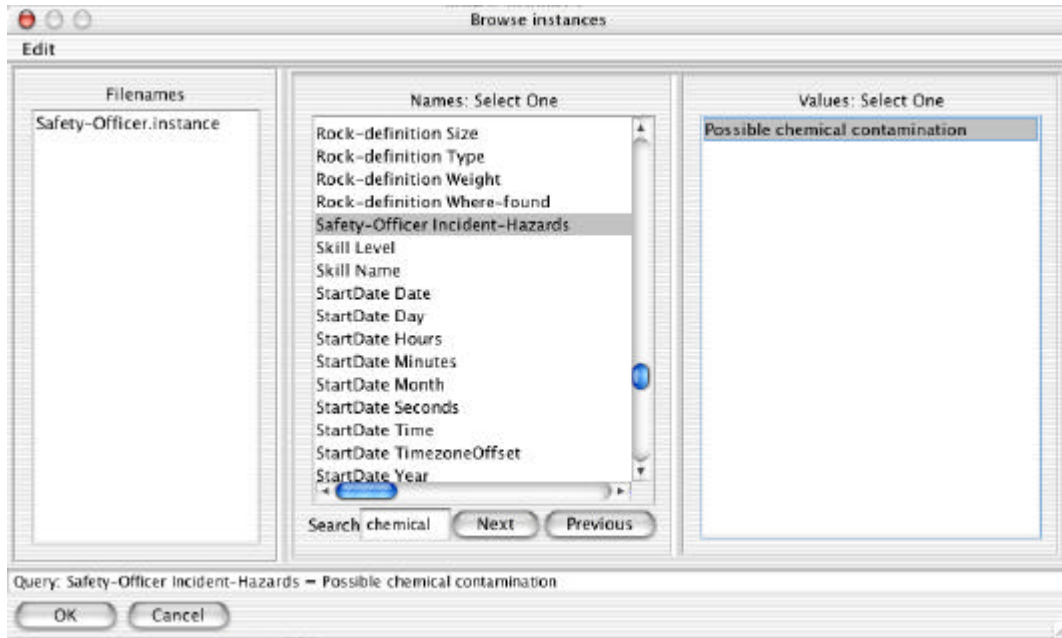


Figure 6 - Tracker Browser Tool

Figure 6 shows an example of how this browsing tool can be used to find, for example a chemical incident hazard, (the value that is displayed in the right hand panel in Figure 6). When the user selects this value, the instance that it is contained in will be displayed in the left hand panel of Figure 6. If the user opens this, they will get the original instance as displayed in Figure 7.

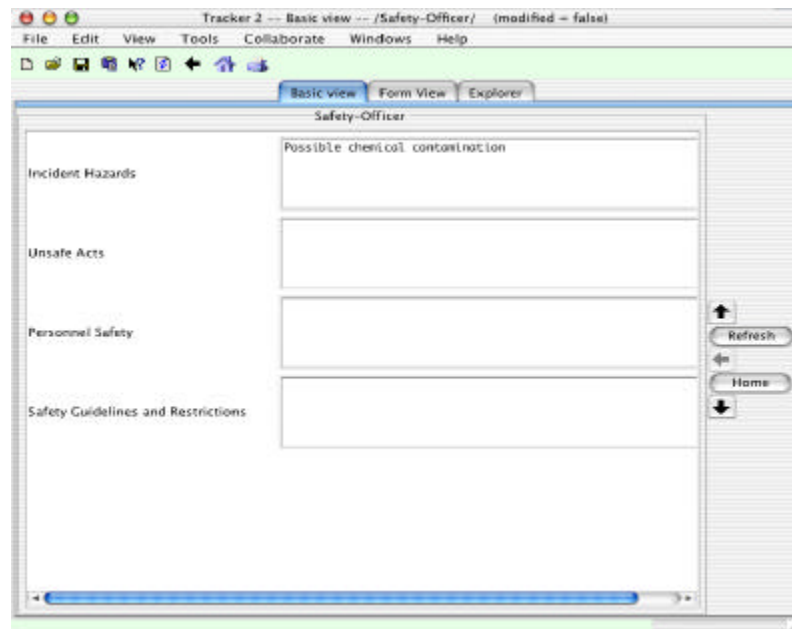


Figure 7 – A Tracker Instance

Other views are available to the user in *Tracker* that are similar to Windows Explorer. Here the user can view the XML tree and make queries for any XML name or field value. We are

currently extending our management capability to allow the user to not only locate data, but to perform some limited “trend analysis” of that data.

Results

Our work to date with *Tracker* and some military crisis action mission planners indicates that *Tracker* is useful in facilitating the development of electronic mission folders and in allowing a group of planners to concurrently use those folders to develop a plan. We have experimented with allowing planners to author a plan as they like, linking the elements of the plan to the sources and applications that they find useful for their work. We have developed ways to make authoring easier and to facilitate communication and collaboration among a group of planners. We have investigated better ways to ensure data propagation in a changing data environment, and to support the management of data in this environment.